O I P E IAP43
APR 18 2006
PATENT & TRADEMARK OFFICE

9Fw

PTO/SB/21 (09-04)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/723,879
Filing Date	November 26, 2003
First Named Inventor	John A. Kolb
Art Unit	3753
Examiner Name	J.K. Ford
Attorney Docket Number	PROL100016000
Total Number of Pages in This Submission	

ENCLOSURES (*Check all that apply*)

- [x] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) ____________
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [ ] Other Enclosure(s) (please Identify below):

Remarks

DECLARATION UNDER RULE 132
REMARKS ACCOMPANYING DECLARATION UNDER RULE 132

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	DeLio & Peterson, LLC		
Signature	Peter W. Peterson		
Printed name	Peter W. Peterson		
Date	April 12, 2006	Reg. No.	31,867

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

Signature	Barbara Browne		
Typed or printed name	Barbara Browne	Date	April 12, 2006

OIPE IAP43
APR 18 2006
PATENT & TRADEMARK OFFICE

PTO/SB/17 (12-04v2)
Approved for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL
For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 0

Complete if Known	
Application Number	10/723,879
Filing Date	November 26, 2003
First Named Inventor	John A. Kolb
Examiner Name	J.K. Ford
Art Unit	3753
Attorney Docket No.	PROL100016000

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): ____________

☑ Deposit Account Deposit Account Number: 04-0566 Deposit Account Name: DeLio & Peterson, LLC

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☑ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☑ Credit any overpayments

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	Filing Fees Fee ($)	Filing Fees Small Entity Fee ($)	Search Fees Fee ($)	Search Fees Small Entity Fee ($)	Examination Fees Fee ($)	Examination Fees Small Entity Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims ______ - 20 or HP = **Extra Claims** ______ x **Fee ($)** 25.00 = **Fee Paid ($)** ______

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims ______ - 3 or HP = **Extra Claims** ______ x **Fee ($)** 100.00 = **Fee Paid ($)** ______

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims Fee ($) ______ Fee Paid ($) ______

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets ______ - 100 = **Extra Sheets** ______ / 50 = **Number of each additional 50 or fraction thereof** ______ (round **up** to a whole number) x **Fee ($)** ______ = **Fee Paid ($)** ______

4. OTHER FEE(S) **Fees Paid ($)**

Non-English Specification, $130 fee (no small entity discount) ______

Other (e.g., late filing surcharge): ______________ ______

SUBMITTED BY			
Signature	[signature]	Registration No. (Attorney/Agent) 31,867	Telephone 203-787-0595
Name (Print/Type)	Peter W. Peterson		Date April 12, 2006

DOCKET: PROL100016000 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR:	John A. Kolb	)	EXAMINER:	J.K. Ford
		)		
SERIAL NO.:	10/723,879	)	ART UNIT:	3753
		)		
FILING DATE:	November 26, 2003	)	DATE:	April 12, 2006
		)		
FOR:	Heat Exchanger Package with Split Charge Air Cooler	)		

REMARKS ACCOMPANYING DECLARATION UNDER RULE 132

Mail Stop ______________
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Name: Barbara Browne Date: April 12, 2006

Signature: Barbara Browne

Dear Sir:

Applicant encloses herewith a Declaration under 37 CFR § 1.132 by Albert Thierfelder, Manager of Test and Reliability at Proliance International, Inc. ("Proliance"), the assignee of the above-identified patent application. The declaration makes of record certain performance advantages of the invention claimed in the subject application when compared to the system described in European patent application no. EP A 0522288, the primary reference on which the above-referenced application has been rejected.

The claimed Proliance invention, as recited in claims 26 and 35, is directed to method for cooling fluids used in an engine of a motor vehicle in which engine coolant and charge air are separately cooled in a heat exchanger assembly comprising a radiator

and upper and lower charge air cooler portions that are positioned and uniquely operatively connected on opposite sides of the radiator.

Specifically, through computer simulations run on Proliance's industry-recognized proprietary PCS computer software, which predicts the thermal performance of packaged cooling systems, the declaration demonstrates that the best simulation of the Proliance method and system described in claim 35 shows significant performance advantages over the best simulation of the EP '288 method and system in Radiator Ambient Capability. Radiator Ambient Capability is the maximum ambient temperature at which the system can be operated without exceeding the maximum allowable radiator top tank temperature. This rating is critical since a Radiator Ambient Capability rating that is only one degree below the minimum specification can cause overheating of the engine, thereby resulting in engine shutdown and possible damage. Additionally, much thinner front charge air cooler core may be used to achieve such improvement in Radiator Ambient Capability rating, thereby saving weight, space and cost over the best EP '288 Simulation. With respect to the Proliance method and system described in claim 26, the declaration demonstrates that the best simulation of the Proliance method and system described therein also permits a thinner front charge air cooler core to be used, when compared to the best simulation of the EP '288 method and system.

In addition to the performance advantages set forth in the declaration, the present invention of claims 26 and 35 is also patentably distinct over the EP '288 reference, in combination with the other cited art, because of the specified operative connection of the charge air cooler portions. The claimed method of the present invention provides the

location of the entry and exit for the charge air at the upper and lower ends of the heat exchange package. This gives the advantage that charge air may be connected at the ends of the heat exchanger package, and does not have to be piped in to an intermediate portion. The method also provides for the conduit connection and charge air flow between the two charge air cooler portions between their respective manifolds that are at ends in line with and opposite each other, around a side of the radiator intermediate the radiator ends. This gives the advantage of a short connecting conduit length, so as to minimize pressure drop between the two charge air cooler portions.

In contrast, the cited EP '288 reference describes a heat exchanger package and method wherein: 1) the charge air inlet is located at the top of the lower rear cooler 4, necessitating piping the charge air to the midpoint of the heat exchanger package, instead of the end, as in applicant's invention; 2) the charge air connecting line 5 runs from the bottom of the lower rear cooler 4 to the bottom of the upper, front cooler 3, instead of between adjacent manifolds on opposite sides of the radiator, as in applicant's invention. The EPC '288 heat exchanger package and method necessitates a longer piping length between the charge air cooler units than applicant's more direct conduit (between manifolds on ends in line with one another), and necessarily subjects the charge air to a greater pressure drop. This latter difference is particularly crucial since the entire object of the charge air system is to provide the engine intake air at a high pressure.

Additionally, the instant invention as described in claims 26 and 35 specifies the location of the first charge air cooler receiving the charge air as being behind the radiator relative to cooling air flow (the upper charge air cooler portion in claim 26; the lower

charge air cooler portion in claim 35) and the flow of the coolant through the radiator (down in claim 26; up in claim 35) also means that the engine coolant entering the radiator is exposed initially to the coolest ambient air, before proceeding to the next radiator portion behind the second charge air cooler portion. This provides the best approach differential between the cooling air and engine coolant temperatures in the portion of the radiator first receiving the engine coolant, where proportionally more cooling occurs. The EP '288 heat exchanger package and method takes a completely different approach and partially heats the ambient cooling air to a degree before the air passes through the upper portion of the radiator, where the engine coolant first enters. This is opposite to applicant's invention, and reduces the approach differential between the cooling air and engine coolant temperatures.

The claimed invention of the subject application also has other differences, as set forth in applicant's Amendment filed on December 21, 2005, which neither EP '288 nor the other cited references disclose or suggest.

It is respectfully submitted that the application has now been brought into a condition where allowance of the entire case is proper. Reconsideration and issuance of a notice of allowance are respectfully solicited.

Respectfully submitted,

Peter W. Peterson
Reg. No. 31,867

DeLIO & PETERSON, LLC
121 Whitney Avenue
New Haven, CT 06510-1241
(203) 787-0595
prol100016000decl_remarks.doc

DOCKET: PROL100016000 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR:	John A. Kolb	)	EXAMINER:	J.K. Ford
		)		
SERIAL NO.:	10/723,879	)	ART UNIT:	3753
		)		
FILING DATE:	November 26, 2003	)	DATE:	April 12, 2006
		)		
FOR:	Heat Exchanger Package with Split Charge Air Cooler	)		

DECLARATION UNDER RULE 132

Mail Stop ______________
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Name: Barbara Browne Date: April 12, 2006

Signature: Barbara Browne

Dear Sir:

I, Albert Thierfelder, do hereby declare as follows:

1. I am an employee of Proliance International, Inc. ("Proliance"), the assignee of the above-identified patent application entitled " Heat Exchanger Package with Split Charge Air Cooler." I hold the position of Manager of Test and Reliability at Proliance.

2. I have a master of science degree in mechanical engineering. I have been employed by Proliance and its predecessor companies since 1996, and previously held the position of Product Engineer. I have been involved in testing radiators and charge air coolers since 1996. I am knowledgeable about and could testify if called as a witness regarding the subject matter of this declaration.

3. This is a declaration for the purpose of making of record certain performance advantages of the invention claimed in the subject application. I have been advised that the above-referenced application has been rejected on the basis of European patent application no. EP A 0522288 owned by Mercedes-Benz AG (the "EP '288 reference").

4. Claim 26 of the subject application stands as follows:

A method for cooling fluids used in an engine of a motor vehicle, comprising:

providing a heat exchanger assembly comprising:

a radiator for cooling engine coolant having opposite front and rear faces through which cooling air flows, opposite upper and lower ends adjacent the faces, and sides adjacent the faces between the upper and lower ends;

a charge air cooler for cooling charge air having upper and lower portions, each charge air cooler portion having opposite front and rear faces through which cooling air flows, opposite upper and lower ends adjacent the faces, and sides adjacent the faces between the upper and lower ends, and including upper and lower manifolds extending across the upper and lower ends, respectively, of each charge air cooler portion, and fluid-carrying tubes extending substantially directly between the upper and lower manifolds of each charge air cooler portion,

the upper charge air cooler portion being disposed in overlapping relationship and adjacent to the upper end of the radiator with the upper and lower ends of the upper charge air cooler portion being oriented in the same direction as the upper and lower ends of the radiator, wherein the rear face at the upper end of the radiator is disposed adjacent the front face of the upper charge air cooler portion and the upper manifold of the upper charge air cooler portion is disposed adjacent the upper end of the radiator, the upper manifold of the upper charge air cooler portion receiving incoming compressed charge air to the charge air cooler,

the lower charge air cooler portion being disposed in overlapping relationship and adjacent to the lower end of the radiator with the upper and lower ends of the lower charge air cooler portion being oriented in the same direction as the upper and lower ends of the

radiator, wherein the front face at the lower end of the radiator is disposed adjacent the rear face of the lower charge air cooler portion and the lower manifold of the lower charge air cooler portion is disposed adjacent the lower end of the radiator, cooled compressed charge air exiting the charge air cooler through the lower manifold of the lower charge air cooler portion, the lower end of the upper charge air cooler portion being in line with and opposite the upper end of the lower charge air cooler portion,

the charge air cooler portions being operatively connected by a conduit extending from the lower manifold at the lower end of the upper charge air cooler portion and around a side of the radiator, intermediate the radiator ends, to the upper manifold at the upper end of the lower charge air cooler portion such that the charge air may flow through the conduit between the lower manifold of the upper charge air cooler portion and the upper manifold of the lower charge air cooler portion;

flowing the engine coolant through the radiator from the upper end to the lower end thereof;

flowing the charge air in sequence in through the upper manifold of the upper charge air cooler portion, the tubes of the upper charge air cooler portion, the lower manifold of the upper charge air cooler portion, the conduit extending from the lower manifold of the upper charge air cooler portion and around a side of the radiator intermediate the radiator ends to the upper manifold of the lower charge air cooler portion, the upper manifold of the lower charge air cooler portion, the tubes of the lower charge air cooler portion, the lower manifold of the lower charge air cooler portion, and to an air intake manifold of the engine; and

flowing cooling air through the heat exchanger assembly such that the cooling air flows sequentially first through the upper end of the radiator and subsequently through the upper charge air cooler portion, and the cooling air also flows sequentially first through the lower charge air cooler portion and subsequently through the lower end of the radiator, to cool the engine coolant in the radiator and the charge air in the charge air cooler portions.

5. Claim 35 of the subject application stands as follows:

A method for cooling fluids used in an engine of a motor vehicle, comprising:

providing a heat exchanger assembly comprising:

a radiator for cooling engine coolant having opposite front and rear faces through which cooling air flows, opposite upper and lower ends adjacent the faces, and sides adjacent the faces between the upper and lower ends;

a charge air cooler for cooling charge air having upper and lower portions, each charge air cooler portion having opposite front and rear faces through which cooling air flows, opposite upper and lower ends adjacent the faces, and sides adjacent the faces between the upper and lower ends, and including upper and lower manifolds extending across the upper and lower ends, respectively, of each charge air cooler portion, and fluid-carrying tubes extending substantially directly between the upper and lower manifolds of each charge air cooler portion,

the upper charge air cooler portion being disposed in overlapping relationship and adjacent to the upper end of the radiator with the upper and lower ends of the upper charge air cooler portion being oriented in the same direction as the upper and lower ends of the radiator, wherein the rear face at the upper end of the radiator is disposed adjacent the front face of the upper charge air cooler portion and the upper manifold of the upper charge air cooler portion is disposed adjacent the upper end of the radiator, cooled compressed charge air exiting the charge air cooler through the upper manifold of the upper charge air cooler portion,

the lower charge air cooler portion being disposed in overlapping relationship and adjacent to the lower end of the radiator with the upper and lower ends of the lower charge air cooler portion being oriented in the same direction as the upper and lower ends of the radiator, wherein the front face at the lower end of the radiator is disposed adjacent the rear face of the lower charge air cooler portion and the lower manifold of the lower charge air cooler portion is disposed adjacent the lower end of the radiator, the lower manifold of the lower charge air cooler portion receiving incoming compressed charge air to the charge air cooler, the lower end of the upper charge air cooler portion being in line with and opposite the upper end of the lower charge air cooler portion,

the charge air cooler portions being operatively connected by a conduit extending from the lower manifold at the lower end of the upper charge air cooler portion and around a side of the radiator, intermediate the radiator ends, to the upper manifold at the upper end of the lower charge air cooler portion such that the charge air

may flow through the conduit between the lower manifold of the upper charge air cooler portion and the upper manifold of the lower charge air cooler portion;

flowing the engine coolant through the radiator from the upper end to the lower end thereof;

flowing the charge air in sequence in through the lower manifold of the lower charge air cooler portion, the tubes of the lower charge air cooler portion, the upper manifold of the lower charge air cooler portion, the conduit extending from the upper manifold of the lower charge air cooler portion and around a side of the radiator, intermediate the radiator ends, to the lower manifold of the upper charge air cooler portion, the lower manifold of the upper charge air cooler portion, the tubes of the upper charge air cooler portion, the upper manifold of the upper charge air cooler portion, and to an air intake manifold of the engine; and

flowing cooling air through the heat exchanger assembly such that the cooling air flows sequentially first through the lower end of the radiator and subsequently through the lower charge air cooler portion, and the cooling air also flows sequentially first through the upper charge air cooler portion and subsequently through the upper end of the radiator, to cool the engine coolant in the radiator and the charge air in the charge air cooler portions.

6. I conducted and supervised the tests and simulations described below to compare the method of cooling engine coolant and charge air using the heat exchanger assembly as described in claims 26 and 35 of the subject application with a method and system similar to that disclosed in the EP '288 reference.

7. The performance characteristics to be tested in computer simulations were: a) the Intake Manifold Temperature Differential (IMTD) for the overall CAC units, which is equal to the measured engine intake manifold temperature minus the measured ambient cooling air temperature, and b) the Radiator Ambient Capability for the radiator, which is the maximum ambient temperature at which the system can be operated without exceeding the maximum allowable radiator top tank temperature. The Radiator Ambient

Capability is numerically equal to the measured ambient cooling air temperature plus the difference between the maximum allowable top tank temperature and the measured actual top tank temperature.

8. In my experience, the more critical performance characteristic is the Radiator Ambient Capability, since a Radiator Ambient Capability rating that is only one degree below the minimum specification can cause overheating of the engine, thereby resulting in engine shutdown and possible damage, and a safety hazard. In contrast, an IMTD rating that is several degrees above the specified maximum might cause a slight reduction in engine performance, but would not cause engine shutdown or damage. It is Proliance's philosophy to increase the Radiator Ambient Capability rating as much as possible above the minimum specification, even if it results in increasing the IMTD rating to close to (but not above) the maximum specification.

9. The computer simulations described herein were run on Proliance's proprietary PCS computer software, which predicts the thermal performance of packaged cooling systems. The PCS computer software has been used and recognized by others in this industry for its capabilities in such thermal performance prediction. Before running the simulations of the methods and systems described in the EP '288 reference and in Claims 26 and 35 of the instant application, a Dyno test is run to determine the underhood conditions of a radiator and CAC package in a test truck, in this case a Kenworth T600 truck with a turbocharged Caterpillar ACERT engine rated at 550 hp that had been tested in Proliance's ambient controlled dynamometer facility. The engine manufacturer's requirements are for an IMTD of 43°F maximum and a Radiator Ambient Capability of

110°F minimum. A Dyno Match is then made to simulate the actual underhood conditions of the test truck in the Proliance PCS software.

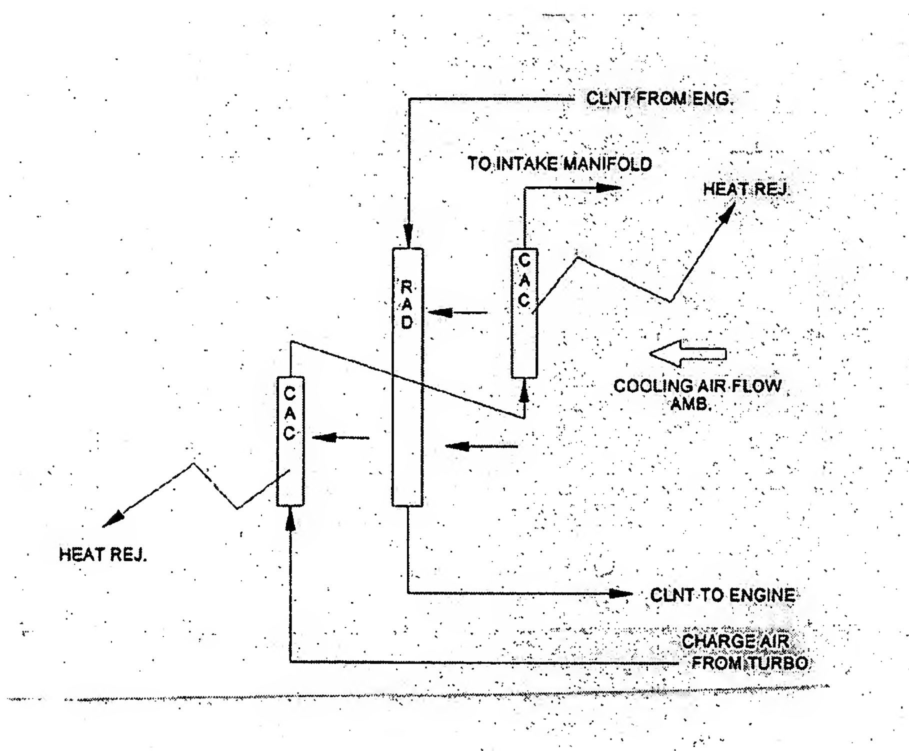
10. In performing the Dyno Match simulation test, the physical and thermal characteristics of the radiator and CAC units in the heat exchanger package and the charge air and coolant flow rates of test truck engine were entered into the PCS software. The computer parameters of cooling air flow path resistance, the cooling air fan volumetric efficiency and the temperature of the charge air entering the CAC units were then adjusted until the resulting Radiator Ambient Capability and IMTD ratings predicted by the PCS computer software were sufficiently close to match to the actual dynamometer test results. The main purpose of performing the Dyno Match simulation is to determine the underhood airflow parameters that can be used in simulations comparing other, similar packaged cooling systems.

11. After performing the Dyno Match simulation, the Radiator Ambient Capability and IMTD ratings were sufficiently close to validate the accuracy of the Radiator Ambient Capability and IMTD performance characteristics of the PCS software simulation for purposes of rendering a meaningful comparison between simulated systems of the prior art EP '288 radiator/CAC package and the radiator/CAC packages described in Claims 26 and 35 of the subject application.

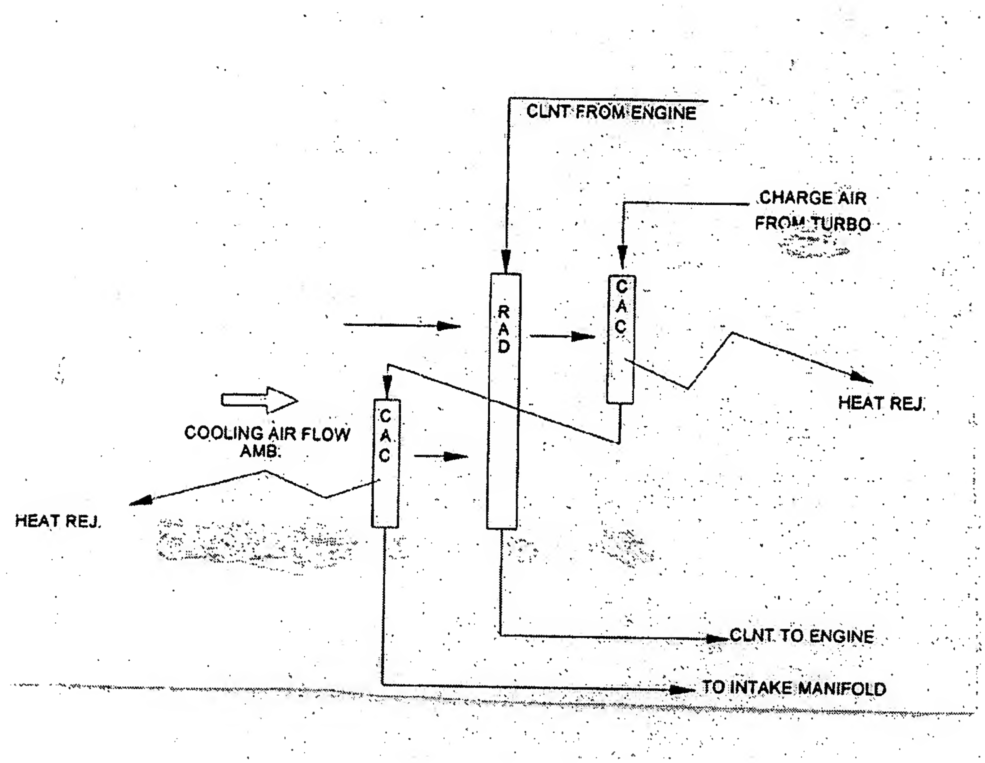
12. Subsequently, the methods and systems described in claims 26 and 35 of the subject patent application were simulated using the PCS computer software and the cooling airflow parameters determined in the Dyno Match simulation. Schematics of the

arrangements of the radiator and charge air cooler portions for the simulations of claims 26 and 35 are shown below.

Schematic of Claim 35 Simulation:



Schematic of Claim 26 Simulation:



13. In the Claim 35 Simulation, the CAC units are arranged with respect to the flow of ambient cooling air so that ambient cooling air flows sequentially first through the upper right CAC unit and subsequently through the upper end of the radiator, and also sequentially through the lower end of the radiator and subsequently through the lower left CAC unit. Charge air from the turbocharger pre-cooler flows first to the bottom of the lower left CAC unit, then from the top of the lower left CAC unit to the bottom of the upper right CAC unit, then out the top of the upper right CAC unit to the engine intake manifold.

14. In the Claim 26 Simulation, the CAC units are arranged with respect to the flow of ambient cooling air so that ambient cooling air flows sequentially first through the

upper end of the radiator and subsequently through the upper right CAC unit, and also sequentially through the lower left CAC unit and subsequently through the lower end of the radiator. Charge air from the turbocharger pre-cooler flows first to the top of the upper right CAC unit, then from the bottom of the upper right CAC unit to the top of the lower left CAC unit, then out to bottom of the lower left CAC unit to the engine intake manifold.

15. Throughout the computer simulations which were run and the results of which follow, the same single downflow radiator configuration was used, having a core depth of 70 mm, with two rows of 32 mm tubes and 16 fins per inch, louvered.

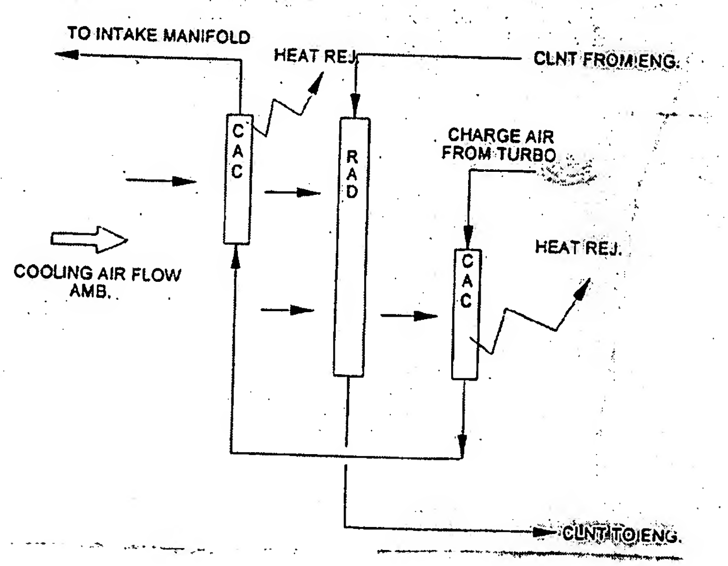
16. In the computer simulations for the Claim 35 Simulation, a number of core styles having different core depths, fin counts and fin types were used for the CAC. To aid in understanding the range of CAC cores used, the following is an explanation of the core codes listed in the tabulated results. The first letter describes the outer fin type. "T" indicates an offset louvered serpentine (corrugated) fin, while "V" indicates a non-louvered serpentine fin with V-shaped turbulating ribs. The second letter, "B," describes the CAC inner fin (inserted inside the CAC tubes) as a channel-type corrugated fin having turbulating bumps. The next two numerals indicate the fins-per-inch for the inner fin. The next numeral and letter "D" indicate the core depth. 1D indicates a depth of 1.44 inches, 2D indicates a depth of 2.046 inches and 3D indicates a core depth of 2.75 inches. The last two digits indicate the fins-per-inch of the outer fin. For the Claim 35 Simulation, the front and rear CAC's can have different core styles.

17. Table I shows the results for the various the Claim 35 Simulations. Note that any result having an IMTD of greater than 43 degrees F or a Radiator Ambient Capability

of less than 110 degrees F is unacceptable. The best results were obtained for a VB182D10 front CAC and TB223D12 rear CAC, giving a Radiator Ambient Capability of 128.2 degrees F and an IMTD of 39.9 degrees F.

18. The results for the Claim 26 Simulations are shown in Table II. The best results were obtained for a VB222D12 front CAC and VB223D12 rear CAC, giving a Radiator Ambient Capability of 126.9 degrees F and an IMTD of 42.2 degrees F. Front CAC Cores VB182D10 and VB182D10 were not run for the Claim 26 Simulations.

19. Finally, the method and system described in the EP '288 reference was simulated using the PCS computer software (the "EP '288 Simulation). A schematic of the arrangement of the radiator and charge air cooler portions used in the EP '288 Simulation is shown below:



20. As shown in the above schematic, the EP '288 simulation used radiator and CAC units similar to those in the Claim 26 and 35 Simulations, except for the following: a)

the CAC units are arranged with respect to the flow of ambient cooling air so that ambient cooling air flows sequentially first through the upper left CAC unit and then through the upper portion of the radiator (where the coolant is hottest), and at the same time ambient cooling air flows sequentially first through the lower portion of the radiator (where the coolant is cooler) and then through the lower right CAC unit; and b) the charge air flow from the turbocharger pre-cooler flows first to the top of the lower right CAC unit, then from the bottom of the lower right CAC unit to the bottom of the upper left CAC unit, and then out the top of the upper left CAC unit to the engine intake manifold.

21. Further, since the EP '288 reference does not disclose the type of radiator and CAC units, we used the same radiator core as in the aforedescribed Claim 26 and 35 Simulations, and simulated four different sets of CAC units which covered the entire range of CAC performance from minimum to maximum.

22. The results for the EP'288 Simulation are shown in Table III. The best results were obtained for CAC Core Configuration A-4, the VB223D12 CAC cores, front and rear. (The EP '288 patent application does not disclose using different CAC core styles front and rear.) The best results for the A-4 Configuration were a Radiator Ambient Capability of 126.9 °F and an IMTD of 32.7 degrees F.

23. A comparison of the results shows that the best result for the Claim 35 Simulation, the B-7 Configuration, provides a 1.3 °F improvement in Radiator Ambient Capability compared to the best result for the EP '288 Simulation, the A-4 Configuration, while providing a 7.2 °F higher IMTD. In my opinion, this indicates that the system described in Claim 35 of the subject application could continue to operate under adverse

conditions (because of a higher Radiator Ambient Capability) which would force the EP '288 system to shut down to avoid engine damage. This provides a distinct and significant advantage in using the method and system described in Claim 35 over that of the EP '288 reference. In contrast, the improved IMTD rating of the EP '288 Simulation is of lesser importance because a slight reduction in engine performance could be tolerated using the Claim 35 method and system, and no engine shutdown would result under more adverse conditions.

24. An added advantage of the Claim 35 Simulation, Configuration B-7, is that it achieves this superior performance with a much thinner front CAC core (2.046 in. versus the 2.75 in. core thickness of the A-4 Configuration), thereby saving weight, space and cost over the best EP '288 Simulation.

25. While the best Claim 26 Simulation shows the same Radiator Ambient Capability as the best EP '288 Simulation, the Claim 26 simulation is more advantageous since it uses a front CAC core depth that is thinner (2.046 in.) than that used in the EP '288 Simulation (2.75 in.), and therefore saves weight, space and cost. Again, the better IMTD rating of the EP '288 Simulation is of lesser importance because a slight reduction in engine performance could be tolerated using the Claim 26 method and system, and no engine shutdown would result under more adverse conditions.

26. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements and the like so made are punishable by fine or imprisonment

or both, under §1001 of Title XVIII of the United States Code and that such willful false statement may jeopardize the validity of the application or any patent issuing thereon.

Albert Thierfelder

Albert Thierfelder

4/11/06

Date

prol100016000del132.doc

TABLE I
RESULTS OF PCS COMPUTER SIMULATION

THE CLAIM 35 SIMULATION

CAC CORE CONFIG.	FRONT	REAR	RAD. AMB. CAP., °F	IMTD, °F
B-1	VB222D12	TB223D12	127.4	34.6
B-2	VB182D12	VB183D12	127.9	44.2*
B-3	VB222D12	VB223D12	127.9	40.9
B-4	VB182D12	VB182D12	127.4	48.9*
B-5	VB223D12	VB223D12	126.7	33.1
B-6	VB182D12	TB223D12	127.6	36.3
B-7	VB182D10	TB223D12	128.2	39.9

TABLE II
RESULTS OF PCS COMPUTER SIMULATION

THE CLAIM 26 SIMULATION

CAC CORE CONFIG.	FRONT	REAR	RAD. AMB. CAP., °F	IMTD, °F
C-1	VB222D12	TB223D12	126.4	36.0
C-2	VB182D12	VB183D12	126.9	45.5*
C-3	VB222D12	VB223DI2	126.9	42.2
C-4	TB182D12	TB182D12	123.6	31.0
C-5	TB223D12	TB223D12	122.5	19.8
C-6	VB223D12	VB223D12	125.6	34.1

TABLE III
RESULTS OF PCS COMPUTER SIMULATION

EP'288 SIMULATION

CAC CORE CONFIG.	FRONT	REAR	RAD. AMB. CAP., °F	IMTD, °F
A-1	TB182D12	TB182D12	124.9	29.7
A-2	TB223D12	TB223D12	123.8	18.8
A-3	VB182D12	VB182D12	130.7	53.4*
A-4	VB223D12	VB223D12	126.9	32.7

*Out of spec.